

Item I:

Scenario I:

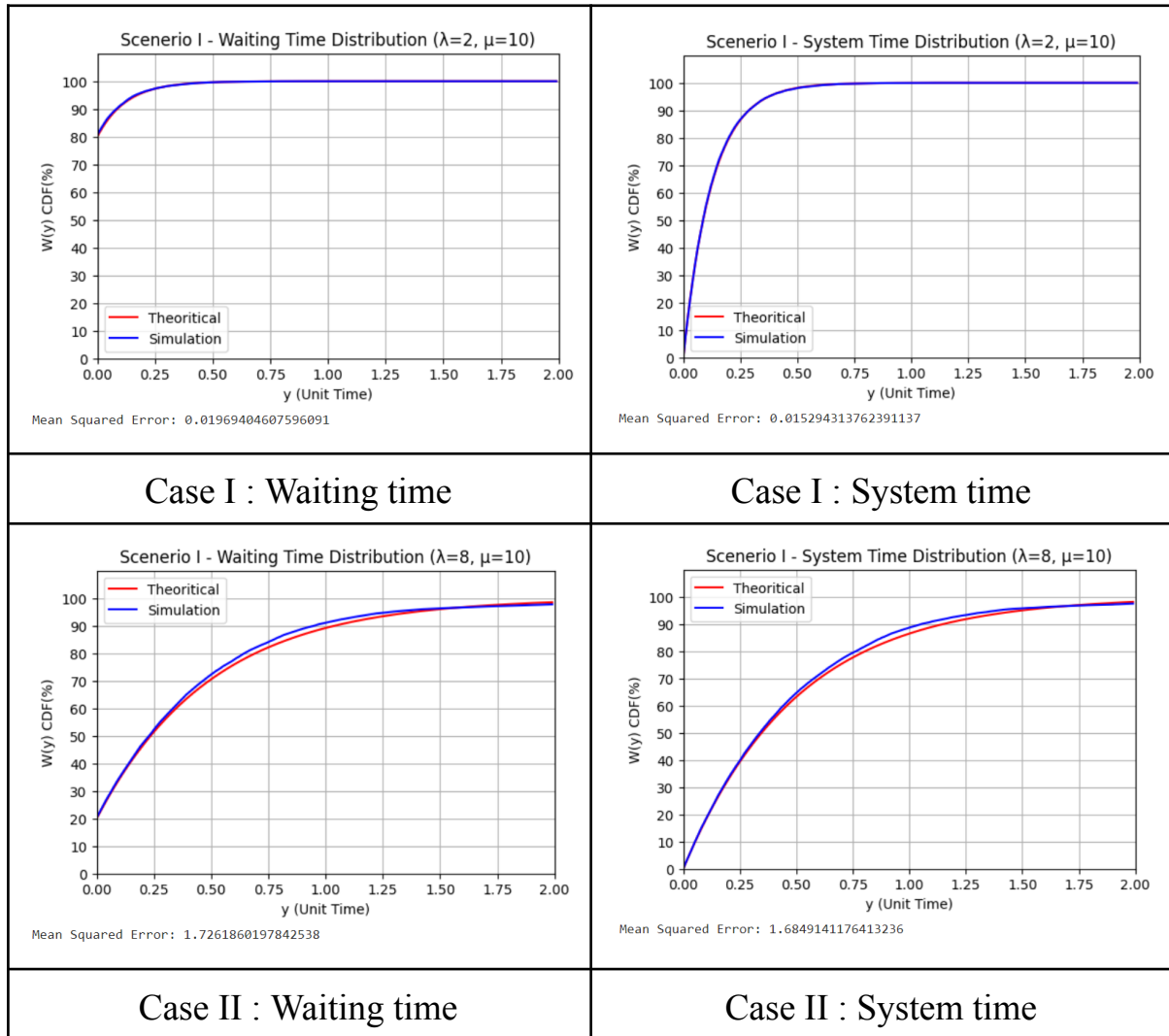
1. use P-K Transform Equation to get the Waiting time CDF and System time CDF
2. Through computation, we can get the $W(t) = 1 - \rho \exp(-\mu(1-\rho)t)$
3. And $S(t) = 1 - \exp(-\mu(1-\rho)t)$
4. These two distribution are theoretical distribution for Waiting time and System time

Scenario II:

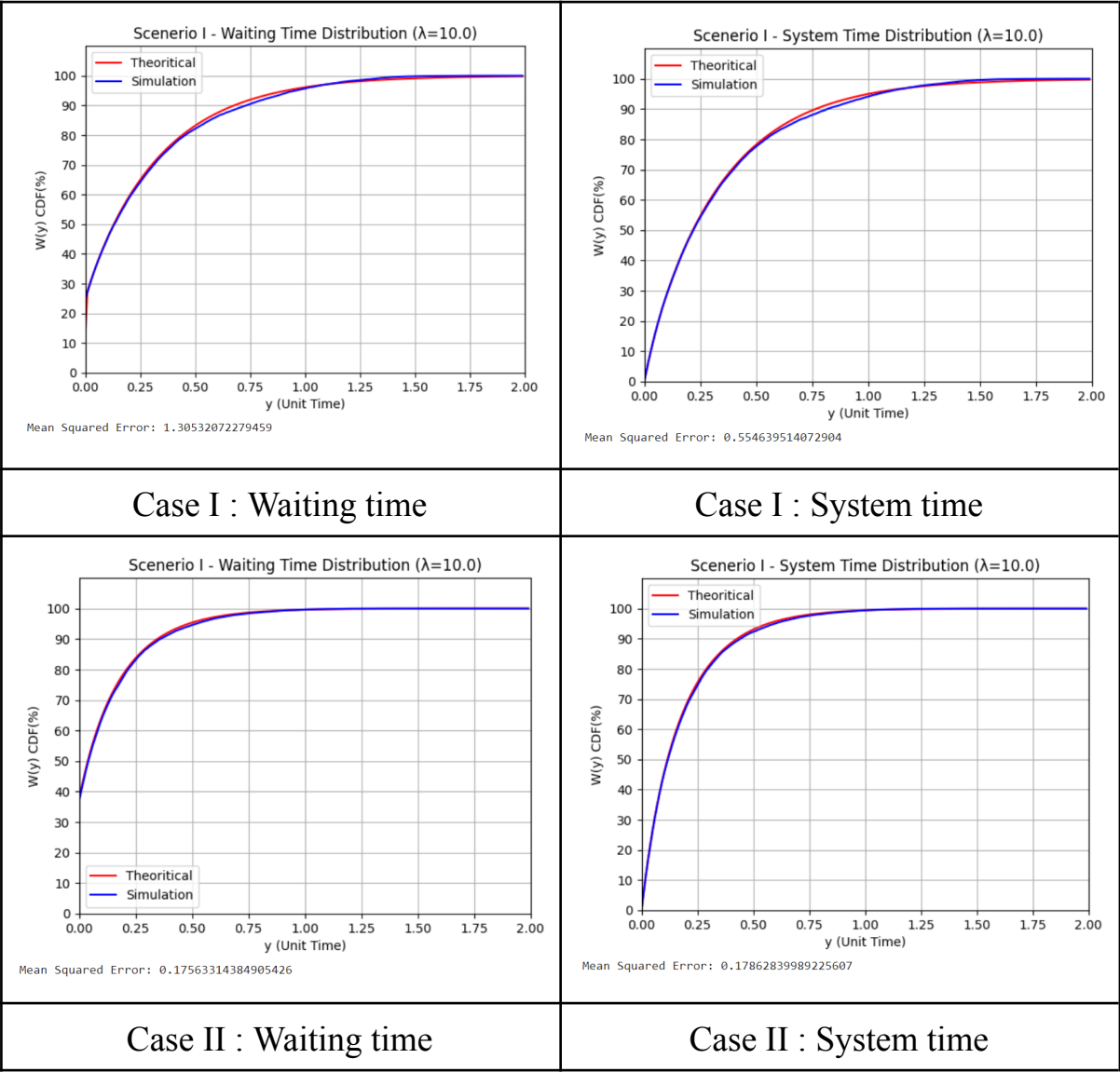
1. In first case, second case, it is hard to calculate with P-K Transform Equation by myself
2. So, I use sympy package to calculate it, sympy can easy to compute Laplace transforms and integrals to obtain theoretical distributions

Item II:

Scenario I:



Scenario II:



Item III:

Scenario I :

Case I : We can see the theoretical and simulation curve will quickly converge, so the MSE between theoretical and simulation is very small, it means these two are very similar.

Case II: In this case, we can find the convergence is slow, and MSE is large than case I , it means the theoretical and simulation has some difference, we can find the convergence speed will influence MSE.

Scenario II :

Case I : In this case, the MSE between theoretical and simulation is large than Case II, means the theoretical and simulation has some difference, and we can see the curve convergence quicker than Case I.

Case II : In this case, the MSE between theoretical and simulation is slower than Case I, means these two are very similar, and we can see the curve convergence slower than Case I.